BOTANIC GARDENS CONSERVATION SECRETARIAT

The International Transfer Format (ITF) for Botanic Garden Plant Records

Final draft, presented to the third meeting of the Taxonomic Databases Working Group, at Edinburgh, October 1987.

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FOREWORD

The Botanic Gardens Conservation Secretariat includes in its aims the provision of a series of technical guides or handbooks for use by its members and by the botanic gardens community in general. It is a great pleasure to present the first of these - The International Transfer Format for Botanic Garden Plant Records. This is intended to facilitate the exchange of computerized information between botanic gardens on their plant collections, especially those of conservation importance.

The need for maintaining complete and accurate records on plant accessions in botanic gardens is an essential requirement for the successful management of scientific and conservation material. This Transfer Format not only provides a means of communication of such information between botanic gardens but of necessity constitutes a set of standards that could be adapted generally for holding botanic garden records.

The main task of writing and coordinating this ITF has been undertaken by Mr Hugh Synge, formerly Head of the Threatened Plants Unit of the IUCN Conservation Monitoring Centre (CMC). It is, however, also the product of cooperation between many individuals and there have been major inputs from Mr Duncan Mackinder, Head of the Computer Services Unit of CMC, and by Dr James Cullen, Assistant Keeper of the Royal Botanic Garden, Edinburgh. Dr Cullen also chaired the workshops that were held as part of the preparations for this ITF. We are also grateful to Dr Kerry Walter of the Center for Plant Conservation, Massachusetts, for his valuable participation and assistance, and to members of the staffs of the Living Collections Division and the Herbarium of the Royal Botanic Gardens, Kew, who have contributed their valuable expertise. Mr Michael Lear has also given much help and Dr Peter Wyse Jackson, Senior Research Officer of the Botanic Gardens Conservation Secretariat, has assisted in the final stages of preparation. To all these colleagues and others not mentioned our grateful thanks. The result of their combined efforts will, I feel sure, be greatly welcomed and valued by the botanic gardens community.

September 1987

Vernon H. Heywood
Director
Botanic Gardens Conservation Secretariat

THE INTERNATIONAL TRANSFER FORMAT (ITF)

FOR BOTANIC GARDEN PLANT RECORDS

WHAT IS AN ITF?

An International Transfer Format (ITF) is a set of standards for exchanging computerised data on a given topic, in this case the records of plants growing in Botanic Gardens. It consists of a set of definitions for the fields within each record.

In an ITF most codes are expanded into their full forms, thereby removing the need for international agreement on their values. Space is not a major constraint, as data will normally be exchanged on magnetic tape, diskettes or other removable media, not over telephone lines. Rather, the overriding considerations are to make the ITF as clear, simple and unambiguous as possible.

Although the ITF is a standard for transfer of data, it does, by implication, set out what information a botanic garden database should contain on each plant accession. These data elements were agreed by a panel of experts convened by IUCN to be the mimumum needed for the purposes of conservation.

WHY IS AN ITF NEEDED FOR BOTANIC GARDEN RECORDS ?

Botanic Gardens have traditionally kept records of their accessions, in ledgers or later often on card indexes. An IUCN survey has shown that many have now put their records on computer and that more plan to do so. The advent of the low-cost Personal Computer (PC), with disk storage of 10 megabytes (Mb) or more, means that a computerised system is within the reach of virtually all gardens.

The principal advantage in computerising garden records is to enable a garden to manage its collections better. This itself is important for conservation. But computerisation also opens the door to a far more effective and powerful means of communication between gardens; if botanic gardens are to be effective as a world network for *ex situ* conservation of threatened plants, it is essential that excessive duplication be avoided and that as many threatened plants as possible be covered. To do this, gardens must be able to share records on their collections with each other, and with the Botanic Gardens Conservation Secretariat (BGCS) or any other central agency so as to receive an analysis of their holdings in comparison with those of others.

Between 1980 and 1986, about 250 Botanic Gardens shared data with the IUCN Botanic Gardens Conservation Co-ordinating Body on their holdings of threatened plants. The data were collected manually and this was both time-consuming for the garden and difficult to keep up to date. The work could be greatly eased and improved if garden collections were on computer and each garden permitted access to its database, say once a year, so as to coordinate the data.

Since 1 January 1987, the Botanic Gardens Conservation Body has been replaced by the Botanic Gardens Conservation Secretariat (BGCS), under the aegis of IUCN, and a greatly expanded programme of monitoring and co-ordinating of plant collections is being planned. The ITF provides the mechanism to achieve this, by enabling any garden to exchange records in a compatible format with any other garden, and to share data with BGCS for conservation purposes.

CAN MY COMPUTER READ AND PRODUCE AN ITF FILE ?

Yes, because the definition of the ITF is independent of hardware and software. It simply declares how the data elements are stored on the medium used for the data transfer.

IUCN has made the ITF as simple as possible so that a great amount of programming expertise is not needed to make files in ITF. For this reason, the ITF is defined using fields of fixed length rather than variable length.

Obviously the two organisations exchanging data need to agree on the physical medium, e.g. 8 inch diskettes, magnetic tape, etc., and on the recording format whereby the file is written on to the medium. The most likely media and formats are:

5 1/4 inch 360 kb IBM-PC format diskettes (floppy disks);
5 1/4 inch 1.2 Mb IBM-AT format diskettes (floppy disks);
3 1/2 inch 1.4 Mb IBM-PS-2 format diskettes (floppy disks);
1/2 inch 9-track industry-standard magnetic tape recorded at 1600 bpi (NRZI), unlabelled.

The Botanic Gardens Conservation Secretariat supports these formats, but will also try to support a variety of other formats; please check with them before committing yourself to a format other than those outlined above.

WILL THE ITF DEFINITION HELP ME PLAN MY OWN GARDEN RECORD SYSTEM ON COMPUTER ?

Yes, because any garden record system will need to include most if not all the fields outlined in the ITF. The ITF definitions of those fields include useful data for the system analyst and computer programmer, because they outline the structure of each field, showing how long it has to be and what logical tests can be applied to it to ensure accuracy of the data. In particular the module on plant names (Fields 6-15) incorporates much taxonomic and nomenclatural expertise contributed by leading specialists; as a result the module is the minimum needed to cover virtually all types of wild and cultivated plant names.

Those not wanting to write complex computer programs for their own databases could simply use the ITF as the internal record structure for a single flat file on their computer. Additional fields, such as codes for families, could be added on the end and "chopped off" when writing ITF files for transfer. In more complex solutions, commonly repeating items like generic names could be held in look-up files, with their associated families, using invisible numeric codes in the main accession file. In this case the program to convert data to and from the ITF will be a little more complex.

IUCN's experience is that the more logical tests the input programmes make on data consistency, the better; the rules outlined under each field give the tests that could be applied.

WHAT DOES THE ITF COVER?

Each record in the ITF refers to a living plant or a group of living plants in a botanic garden that has been acquired as a separate addition or element of the collection. Each such entity is called an Accession (See General Rule of Information 1, below).

For each accession, the ITF record contains the basic minimum data required for the purposes of conservation. This consists of:

a) *File Identification data* Internal information about the arrangement of the data that follow.

b) *Accession data* The unique identifiers, usually numbers, assigned by the garden to each plant. This enables two or more users of the system to be sure they are refering to the same individual or planting of a taxon.

c) *Plant name* The full scientific (Latin) name of the plant, identified as accurately as possible.

d) *Verification data* A set of fields to indicate the degree of confidence which may be placed in the identification of the plant's name.

e) *Sexuality* The sex of the plant accession.

f) *Source data* How the plant was obtained and how it has since been propagated.

g) *Place of origin.* Where the plant came from, with supporting data, such as altitude, if of wild origin.

h) *Conservation Data.* The degree of threat to the taxon in the wild. (This is included so that the IUCN Threatened Plants Unit can add the conservation category into the datafiles of individual gardens, rather than the categories be assigned by garden staff.)

Many gardens may hold and may wish to exchange other data relating to their plant records, e.g. habit, frost-hardiness, flowering season, and literature references. BGCS has invited the Center for Plant Conservation in Massachusetts to prepare some proposals for standardisation of fields such as these; the fields can then be added on the end of the ITF as optional "bolt-on" extras.

BBCS's view, however, is that the ITF records should be used primarily for data relating to an *accession* rather than to a *taxonomic group* (e.g. species, variety, cultivar, etc.). Thus data on how best to cultivate a species or on its global distribution should be stored and exchanged in files different from the garden record datafiles from which ITF files are made. (BGCS has invited Dr James Cullen, Royal Botanic Garden, Edinburgh, to look at the feasibility of a separate system of sharing and exchanging data on how to grow individual taxa. The intention is to design a "recipe" database to which all gardens could contribute and to which all gardens could have access. This is clearly a complex task and is quite a separate issue to the use of the ITF and its definition.)

HOW DOES THE ITF FIT INTO THE BGCS'S PROGRAMME?

In May 1986, all gardens in the IUCN Botanic Gardens Conservation Co-ordinating Body were sent the draft ITF paper and asked (a) for their comments on it, and (b) whether they would be in a position to supply data in the ITF. The intention was not to press gardens rapidly into this development, but rather to find a few gardens that could try out the system. The response has been most encouraging. Nevertheless, the BGCS, which has replaced the "Body", will also continue with manual systems of monitoring *ex situ* collections for some years to come.

In parallel, BGCS has commissioned a handbook on garden plant recording. This will greatly expand the material in the previous paper (Cullen *et al.*, 1985/7), which has been found to be very useful, and will outline the various procedures involved, ranging from the preparation of garden maps and attaching labels to specimens to card indices and computers.

BGCS is also working very closely with the Center for Plant Conservation in Massachusetts on a generalized plant record database management system. This runs on MS-DOS machines, e.g. the IBM PC and its many compatibles, and would enable any garden to handle their plant records. It allows users to exchange data through ITF. For more details see Threatened Plants Newsletter 16: 23 (1986) or call or write to:

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Center for Plant Conservation
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The BGCS is also hoping to work with the International Species Inventory System (ISIS), who have developed a very advanced programme on monitoring zoo collections of animals and who provide participating zoos with software.

HOW WAS THE ITF DEVELOPED?

In July 1985, the IUCN Threatened Plants Unit hosted a small meeting at Kew to discuss the possibility of developing an ITF for garden plant records. A second workshop was held later that summer, and following a consultancy by Michael Lear, a lengthy paper was assembled by Dr James Cullen. Contributions were made by many botanists, in particular at Kew, and by many conservationists.

The paper, entitled "Principles and Standards for the Computerisation of Garden Record Schemes, as applied to conservation, with proposals for an International Transfer Format", was presented to the conference on Botanic Gardens and the World Conservation Strategy, arranged by IUCN in the Canary Islands, November 1985. 179 delegates attended, representing Botanic Gardens in 39 countries. The paper was discussed in outline at an evening session and the conference formally:

"Recommended Botanic Gardens to computerise their plant records so as to aid management of their collections and to permit data exchange both between gardens and with international organisations;

"Requested the IUCN Conservation Monitoring Centre to continue its work on the conceptual basis for computer record schemes and on the International Transfer Format (ITF) by further collaboration with Botanic Gardens."

In pursuit of this recommendation, the paper was sent to all Botanic Gardens in the Botanic Gardens Conservation Co-ordinating Body with an invitation to submit comments and consider provision of tapes or diskettes with holdings in ITF form. Numerous other copies have been distributed. The response has been very positive. The proposal was also submitted to the Taxonomic Databases Working Group, a consortium of the major taxonomic institutions and database organizations of the world, at their second meeting (Pittsburgh, 1986), and was approved in principle as one of the interlocking set of standards for computerisation of all kinds of botanical data.

In November 1986, a small meeting was held to agree the final changes to the format. This manual, prepared by Hugh Synge with the CMC Computer Services Unit, is the result.

Each record in the Format contains data on one plant accession. Each record consists of 362 bytes, made up of a set of *Fields*, such as Genus, Species, Source, and so on. Physically the record is just a string of characters, but because the exact position of each field is defined in the Format, the receiving program can determine which part of the record is the Genus, which the Species and so on.

The content and position of each field are defined in the pages that follow. At the top of the definition of each field is a small table that provides essential data about the position of the field. First is a suggested short version of the name (8 characters or less); this may be helpful for programmers implementing the ITF on systems that limit the lengths of field names. The final elements in the table are the starting position of the field in the record and the length of the field. (The fields are also numbered sequentially for ease of use).

To ensure consistency, each field is constrained by rules. These rules are of two types:

Rules of Syntax These apply to the *structure* of the data item. They include rules about how the information is placed in the space available and cover general constraints relating to the information (e.g. that a genus must be a single word and starts with a capital letter). A characteristic of a Rule of Syntax is that the user can normally check whether or not the rule has been obeyed with the information provided in this Manual.

Rules of Information These apply to the particular *values* used in the field and the *meaning* of those values. Normally a Rule of Information cannot be checked without additional knowledge. This usually takes the form of a look-up table, which might cover, for example, all the genera that had been validly published or all the country codes in the ISO list.

Both these types of rule are vital in the definition and use of the ITF if users are to avoid mismatched records and consternation.

There are some Rules of Syntax and Information which apply to all fields in the record, and so are outlined here rather than reproduced under the definition of each field.

GENERAL RULES OF SYNTAX

1. All data must be expressed using printable ASCII codes; these are the codes from 32 Decimal to 122 Decimal inclusive (i.e. Hexdecimal 20 to 7A). These codes are listed in Annex 2.

   ASCII is the American Standard Code for Information Interchange and was chosen because it is the character code used on the majority of computer systems.

   There are a number of extensions to ASCII and variations to it, mostly outside the range of codes given above. These differ from one computer to another; for this reason it is important to use the codes exactly as defined in Annex 2. This does *not* include any characters with accents or other diacritical marks. Therefore the data in the ITF must *not* include any characters with accents, because their coding is not defined by ASCII and so varies from one computer to another.

2. Entries must always start from the first (left-most) byte in the field. If an entry does not fill the space allocated, it should be padded to the right with spaces.

Notes

Wherever possible the definitions avoid the use of the following characters as codes:

"?" (as it causes problems with certain PC database systems, e.g. Revelation)
"O" (Capital O) (because of confusion with zero - 0)
"l" (Lower case ell) (because of confusion with one - 1).

GENERAL RULE OF INFORMATION

1. Each record must refer to a plant grown in a Botanic Garden. One record is given to each accession. One accession may cover more than one *individual* specimen, for example if plants have been raised from seed, or if several individuals have been collected from one site at one time. It *must not*, however, cover individuals of the same taxon collected from different places or at different times.

Notes

The rules that follow make references to the International Code of Botanical Nomenclature (the "Botanical Code") (Voss *et al.*, 1983) and the International Code of Nomenclature for Cultivated Plants (the "Cultivated Code") (Brickell *et al.*, 1980). These are the agreed sets of rules by which botanists and horticulturists name plants. Both are cited in full under the references at the end of this manual.

The BGCS intend to prepare a computer programme that will test ITF files against the rules in this manual as carefully and as completely as possible. After this has been used by the BGCS on some ITF datafiles, it will be made widely available, both as a worked example of how these rules can be tested and for general use by gardens in validating their data. Please write for details (available after January 1988).

Some examples of data in the ITF are given at the end of this Manual.

A. FILE IDENTIFICATION DATA

Internal information about the arrangement of data that follows.

Field 1: Record Type

Short Name	RECTYPE
Start Position	1
Length	1

A number to indicate the type of record that follows. A Type 1 record contains general information about the source of the file. Type 2 records are records on individual plant accessions, as defined in the rest of this Manual. A Type 9 record marks the end of the file.

Users are *recommended* to write a single Type 1 record at the front of the file (of Type 2 records), but this is not a requirement of the ITF definition.

Users are *required* to write a single Type 9 record at the end of the file. This is required because different computer systems use different methods to determine the location of the end of the file.

Rules of Syntax

1. The Record Type must be "1", "2" or "9". Space or zero, or any other character, are not allowed.

Rules of Information

1. If Record Type is "1", the data in the record is as defined below:

Starting Position	*End Position*	*Length*	*Meaning*	*Notes*
1	1	1	Record Type, Value is "1".	
2	31	30	Name of institution preparing the ITF file	
32	39	8	Date the ITF file was written	Format follows notation of Field 18, Verification Date
40	47	8	Date to which the file refers	Ditto
48	67	20	Contact Name	Name of person preparing the file
68	72	5	ITF version	Present version is "01.00".

73	362	290	File contents	Free text, to describe contents of file.

2. If the Record Type is "2", the data the record covers a plant accession in the form of Fields 1 - 32, as defined in the rest of this Manual and as summarised below.

Starting Position	*End Position*	*Length*	*Short Name*	*Long Name*
1	1	1	RECTYPE	Record Type, Value is "2"
2	2	1	RECSTAT	Record Status
3	7	5	GARDCODE	Garden Code
8	19	12	ACCID	Accession Identifier
20	20	1	ACCSTAT	Accession Status
21	21	1	GENHYB	Intergeneric Hybrid/Graft Chimaera Flag
22	43	22	GENUS	Genus
44	44	1	SPECHYB	Interspecific Hybrid Flag
45	84	40	SPECIES	Species
85	85	1	AGGFLAG	Aggregate Flag
86	86	1	INFRANK	Infraspecific Rank Flag
87	126	40	INFREPI	Infraspecific Epithet
127	156	30	CULTIVAR	Cultivar
157	157	1	RANKQUAL	Rank Qualified
158	158	1	IDQUAL	Identification Qualifier
159	159	1	VERILEV	Verification Level
160	179	20	VERIFBY	Verifier's Name
180	187	8	VERIDATE	Verification Date
188	188	1	SEX	Sex
189	189	1	PROVTYPE	Provenance Type
190	191	2	PROPHIST	Propagation History
192	192	1	DONORTYP	Donor Type
193	212	20	DONOR	Donor
213	224	12	DONACCID	Donor's Accession Number
225	226	2	ISOCODE	Country of Origin
227	256	30	GEOGAREA	Geographical Area
257	296	40	LOCALITY	Locality
297	305	9	ALTITUDE	Altitude
306	312	7	LATITUDE	Latitude
313	320	8	LONGTUDE	Longitude
321	350	30	COLNAME	Collector's Name
351	360	10	COLID	Collector's Identifier
361	362	2	IUCNCAT	IUCN Conservation Category

3. If the Record Type is "9", the data in the record is as follows:

Starting Position	*End Position*	*Length*	*Meaning and Notes*
1	1	1	Record Type, Value is "9".
2	12	11	Value is "END OF FILE".
13	362	350	Free space for comments; set at spaces if not needed.

Field 2: Record Status

Short Name	RECSTAT
Start Position	2
Length	1

The status of the record for the receiving database, giving the ability to show whether the receiving database should add the record, amend an existing record or delete a record.

Rules of Syntax

1. The Record Status must consist of one of the following characters:

Syntax	*Information*
Space	No instructions are given to the receiving database about what to do with the record
A	The record should be added to the receiving database
M	The record in the receiving database with the same Garden Code and Accession Identifier should be modified into the form of this record
D	The record in the receiving database with the same Garden Code and Accession Identifier should be deleted

Notes

The intention of this field is to greatly reduce the amount of data that need be transmitted between databases that regularly exchange data. To do this, each transmission would only contain the changes since the last transmission, using the notation outlined above.

B. ACCESSION DATA

The Accession Data, comprising the fields Garden Code, Accession Identifier and Accession Status, the first two of which provide a unique identifier for every cultivated plant record in the world.

Field 3: Garden Code

Short Name	GARDCODE
Start Position	3
Length	5

The IAPT code for the Garden to which the plant record refers.

Rules of Syntax

1. The code must consist of an entry of 1-5 upper case letters (A-Z).

2. The field may not be left blank.

Rules of Information

1. The entry in the field must be the value defined by the International Association for Plant Taxonomy (IAPT) for the botanic garden to which the plant records refer.

Notes

The IAPT codes were designed originally for herbaria, but have been adapted and developed further for botanic gardens jointly by IUCN and IAPT. All Gardens in the Botanic Gardens Conservation Co-ordinating Body and now the BGCS have valid codes.

If a garden does *not* have a code, and does not have an herbarium which has a code, it should write to IAPT (c/o Editor of *Index Herbariorum*, The New York Botanical Garden, Bronx, New York 10458, U.S.A) or the Botanic Gardens Conservation Secretariat (53 The Green, Kew, Richmond, Surrey TW9 3AA, U.K.), to agree on the code. IAPT is very happy for gardens to propose their own codes, but will insist that the value chosen has not been used already and is in accordance with its rules. Codes should be mnemonic for the location, e.g. ATLA or ATLIS for the Atlantis Sunken Botanic Garden, rather than reflect the acronym, e.g. ASBG in this example. In particular, the use of BG should be avoided for Botanic Garden.

Gardens need to be very clear with IAPT and BGCS about whether or not their satellite gardens have separate codes from the parent garden. This is left at the discretion of individual gardens. Once a choice has been made, it clearly cannot be changed without great upheaval.

Field 4: Accession Identifier

Short Name	ACCID
Start Position	8
Length	12

The unique identifier, often called "Accession Number", used internally by the garden to record each accession.

Rules of Syntax

1. The Accession Identifier may consist of any characters in the ASCII character set (Annex 2).

2. The entry should be justified (ranged) left, even if it is solely a number, with the first digit being placed at the first position in the field. If, for example, the value is 234, the "2" should be at Position 8, the starting position, rather than 3 characters to the left of Position 19, the last position.

3. The field may not be left blank.

Rules of Information

1. The Accession Identifier should be a unique set of characters which identifies each plant in the garden's own record system.

2. In the case of multiple plants of the same taxon from one collection site or multiple plants derived from a single seed sowing, a single value of the Accession Identifier is permissable.

3. The same values of the Accession Identifier should *not* be used again as plants die or are given away.

4. The Accession Identifier for a plant should not be changed during the life of that plant.

Notes

Many gardens include punctuation within their Accession Identifier, e.g. 82-BG-24-31. It is vital for a garden to be consistent on whether the punctuation is included in the ITF.

Field 5: Accession Status

Short Name	ACCSTAT
Start Position	20
Length	1

A flag to indicate whether the plant is a current accession in the garden or not.

Rules

1. The Accession Status must consist on one of the following characters:

Syntax	*Information*
C	Current accession in the living collection
D	Non-current accession due to death
T	Non-current accession due to transfer to another record system, normally of another garden

2. The Accession Status must not be left blank.

Note

In some systems, records of dead plants are left in the datafile and flagged as dead. In others, however, records of dead plants are put in a separate file or are deleted altogether; each of these two practices is quite suitable for the internal files, but in ITF the status must be clearly marked so that all the information is in the record itself. One advantage of keeping records of plants that appear dead is that roots may sprout or seedlings may appear years later.

C. PLANT NAME

The full scientific (Latin) name of the plant, identified as accurately as possible.

The module for the Plant Name has been derived after discussion and input from many botanists. It has been approved in principle by the Taxonomic Databases Working Group, a consortium of the world's leading taxonomic institutions and database organisations, for systems that use rather than revise or generate plant names. It will be compatible with the more complex module being derived by the Group for taxonomic checklists, known as the Minimal Functional Nomenclator (MFN).

Hybrids present considerable problems for handling of their names in a computer. The present system handles them, but not perfectly. Annex 1 provides some notes on how hybrid names are constructed, with details on how to handle them in the ITF.

The present module does not contain any facility for synonyms, as this is not considered necessary for exchange of garden record data. Individual gardens may want to treat synonyms in different ways, depending on their needs, but, in terms of transmission of information, there are many problems connected with synonyms, not all of which are easily soluble.

Common (vernacular) names are not included, since they vary greatly, are often not unique for individual species, and are not needed for data transfer. Nor are the names of higher groups such as families required for the ITF, since each accepted genus name in the plant kingdom is unique. Furthermore, there is no agreement among taxonomists on the circumscription of plant families. Each garden is free to use whichever system it pleases in its own system.

It was also decided to exclude authorities from the ITF. (The authority, in a botanical context, is the name, usually abbreviated, of the botanist who coined or published the name of the plant.) The reason for using authorities is generally stated to prevent confusion between homonyms (the same name having been used for two different taxa; all but one of these names will be technically illegitimate.) While this is important for technical taxonomy, its effects on garden records are small and usually obvious. Authorities, even if abbreviated, are very consuming of time and space, while adding little or nothing of substance in the present context.

Experience in building the IUCN database has also shown that whereas the spelling of the Latin component of plant names is very consistent from one work to another, the citation and spelling of authorities varies greatly; abbreviations vary as do interpretations on who was the true author. Thus where the authority of a plant in one datafile differs from that of the same plant in another datafile, it is most likely that this is due not to homonymy but to minor differences in author citation. This is another good reason for not including authorities in the ITF.

Identification Qualifiers

Botanists sometimes add various terms, such as "cf." and "aff.", to the name of a plant to indicate a degree of uncertainty of identification. This is often the case where a plant is taxonomically critical or with garden plants that are of uncertain origin or that do not produce flowers or fruits. The term applies to the part of the name that immediately *follows* the term. They can be placed in front of any element of the name.

It is important to note, however, that the meaning of the various terms is uncertain. There are no agreed definitions, and the distinctions between the various terms are small. So naturally those who identify plants should avoid using them wherever possible. But where they are used, garden record databases should include them so as to be able to record the uncertainty of the identification.

For conservation purposes, BGCS propose to treat taxa qualified in this way as identified only to the level one above the rank qualified, i.e. a garden record of *Cypripedium* aff. *candidum* is treated not as a valid cultivation record of the threatened plant *Cypripedium candidum* but only as a record for the genus *Cypripedium*.

With infraspecific taxa and cultivars, no distinction is made between whether the term (e.g. "aff.") is added before the rank of the qualified part of the name or after it. In other words, the ITF codes *Prunus maritima* aff. var. *gravesii* and *Prunus maritima* var. aff. *gravesii* identically, and does not recognise any botanical difference between them.

Field 6: Intergeneric Hybrid/Graft Chimaera Flag

Short Name	GENHYB
Start Position	21
Length	1

A flag to indicate whether the name in the field Genus (Field 7) is an Intergeneric Hybrid or an Intergeneric Graft Chimaera.

Rules

1. The Intergeneric Hybrid/Graft Chimaera Flag must consist of one of the characters in the table below:

Syntax	*Information*
space	The Genus is not hybrid (normal situation)
X	The Genus is an Intergeneric Hybrid
+	The Genus is an Intergeneric Graft Hybrid or Graft Chimaera;

Notes

1. The rules associated with these values are outlined under the next field, Genus.

2. The value stored in this field for an intergeneric hybrid is capital "X" not a multiplication sign.

Field 7: Genus

Short Name	GENUS
Start Position	22
Length	22

The generic name of the plant.

Rules of Syntax

1. The genus must be a single word, and must not be left blank.

2. The first letter must be in upper case (A-Z), the rest of the word in lower case letters (a-z).

3. One or two hyphens are permitted in the word; no other characters other than the letters outlined above are permitted.

4. If the genus is more than 22 characters long, it should be truncated, not abbreviated. (No examples known).

Rules of Information

1. If the Intergeneric Hybrid/Graft Chimaera Flag (GENHYB) is a space, the Genus must be either:

   1.1 A non-hybrid name, validly published under the Botanical Code;

   1.2 If the genus of the plant is unknown, the family should be entered, e.g. "Acanthaceae", as family names are unique from generic names. In this case, the rest of the field should be left blank, as should the following five fields (Fields 8-12).

   1.3 If the genus and the family are unknown, the field should contain the word "UNKNOWN". In this case the following five fields (Fields 8-12) should be blank also. (Capital letters are used so that the word stands out from Latin names).

2. If the Intergeneric Hybrid/Graft Chimaera Flag (GENHYB) is "X", the genus must be an intergeneric hybrid name, validly published under the Botanical Code, e.g. "Halimiocistus" for × *Halimiocistus sahucii.*

3. If the Intergeneric Hybrid/Graft Chimaera Flag (GENHYB) is a plus sign, the genus must be an intergeneric graft hybrid or graft chimaera validly published under the Cultivated Code, e.g. "Crataegomespilus" for + *Crataegomespilus dardarii.*

Notes

1. One or two hyphens, no more, are permitted in generic names. All second-word elements (e.g. *Roya* in *Fitz-Roya*) should be decapitalised, e.g. as *Fitz-roya.* Other examples are *Saxe-gothaea* and *Drake-brockmania.*

2. As outlined in General Rule of Syntax 1, diacritical characters such as accents are not permitted in the ITF. Therefore genera such as *Dioön* should be represented in the ITF as "Dioon".

Field 8: Interspecific Hybrid Flag

Short Name	SPECHYB
Start Position	44
Length	1

A flag to indicate various hybrid characteristics of the entry in SPECIES (Field 9).

Rules

1. The Interspecific Hybrid Flag must consist of one of the characters in the table below:

Syntax	*Information*
space	The Species is not a hybrid
X	The Species is a Latin Collective Name for an interspecific hybrid
H	The Species is a Hybrid Formula for an interspecific hybrid
+	The Species is an interspecific graft-chimaera

2. If the Species is blank, this field must be blank also.

Notes

1. The rules associated with these values are outlined under the next field, Species.

2. The value stored in this field for a Latin Collective Name of an intergeneric hybrid is a capital "X" not a multiplication sign.

3. The terms Latin Collective Name and Hybrid Formula are explained with examples in Annex 1.

Field 9: Species

Short Name	SPECIES
Start Position	45
Length	40

The specific epithet of the name of the plant.

Rules of Syntax

1. The specific epithet must be one word (except as in the cases of Rules of Information 1.1, 1.2, 2 and 3, below).

2. It must consist of lower case letters (a-z), and may contain one or two hyphens. No other characters are permitted (except in the cases of Rules of Information 1.1 and 1.2).

3. If the specific epithet is over 40 characters long, it should be truncated, not abbreviated. (No examples known over 22 characters other than Hybrid Formulae.)

4. The field may be left blank if the species epithet is unknown. It must be left blank if the Genus is unknown (represented by the Genus field containing a family name or the word "UNKNOWN").

Rules of Information

1. If the Interspecific Hybrid Flag (SPECHYB) is a space, the species must be a validly published, non-hybrid specific epithet under the Botanical Code, except in the following special cases:

    1. If the plant has not been identified to specific level, the field must be blank as must the following three fields. (The abbreviation "sp." should *not* be entered in these circumstances.)

    2. Where a new species has not been formally described, "sp. nov." should be entered, if possible followed by a unique identifier, such as the collector's name and number or the locality. The following three fields (Fields 10-12) must be blank.

2. If the Interspecific Hybrid Flag (SPECHYB) is X, the value in the field must be a Latin Collective name for an interspecific hybrid, e.g. "tellmaniana" for *Lonicera* × *tellmaniana.*

3. If the Interspecific Hybrid Flag (SPECHYB) is H, the value in the field must be a Hybrid Formula, with the lower case letter "x" between the species epithets of the two parents, e.g. "dichroanthum x griersonianum" for *Rhododendron dichroanthum* × *griersonianum.* If this phrase is too long, truncate from the right of the second name.

    If only one parent is known, enter the specific epithet of that parent alone.

4. If the Interspecific Hybrid Flag (SPECHYB) is a plus sign, the value in the field must be an Interspecific Graft Chimaera (e.g. "correlata" for *Syringa + correlata*).

Notes

1. IUCN recommend that databases using fixed length fields allocate 22 characters for species epithets. The value of 40 is allocated here to allow for hybrid formulae (Rules of Information 3, above).

2. The word "sp." is not used in the ITF where the plant has not been identified to species level (Rule of Information 1.1, above). However, gardens may of course wish to program their own internal systems so that the word "sp." appears on printouts in this situation.

Field 10: Aggregate Flag

Short Name	AGGFLAG
Start Position	85
Length	1

A group of closely related species that are difficult to distinguish among themselves is sometimes referred to as a whole by botanists as an aggregate species (usually with the Latin name followed by "agg."); the constituent species are referred to as segregate species or microspecies. The flag is used to indicate that an aggregrate species is referred to.

Rules of Syntax

1. The entry must be either "A" or space.

Rules of Information

1. If the entry is "A", the plant has been identified to an aggregrate species, and not to any of the segregate microspecies within the aggregrate. (In outputs, the word "agg." is normally written after the species name.)

2. If the entry is "A", the following two fields of Infraspecific Rank Flag and Infraspecific Epithet must be left blank.

Notes

1. It is not possible to use the Aggregate concept at levels other than the species level.

2. The terms "collective species" or "species groups" are sometimes also used in plant names. They should be treated as for aggregate species.

Field 11: Infraspecific Rank Flag

Short Name	INFRANK
Start Position	86
Length	1

A flag to indicate the rank of the Infraspecific Epithet (INFREPI) stored in the following field.

Rules of Syntax

1. If the Infraspecific Epithet (INFREPI) is spaces, this field must be spaces also.

2. If the Infraspecific Epithet (INFREPI) is not spaces, this field must be one of the values in the table below:

Syntax	*Information about Infraspecific Epithet*
Non-hybrid names	
S	Subspecies
V	Variety
F	Form
Hybrid Formulae Names	
H	Hybrid between 2 subspecies
I	Hybrid between 2 varieties
J	Hybrid between 2 infraspecific ranks that are different
Latin Collective Names	
K	Hybrid between 2 subspecies
L	Hybrid between 2 varieties
M	Hybrid between 2 infraspecific ranks that are different
Other Names	
G	Non-Latin Collective Name (mainly Grex)
U	Cultivar Group Name (see Note 2)

Notes

1. Annex 1 explains the meaning of the various hybrid terms used above, in particular the difference between Hybrid Formulae names and Latin Collective Names.

2. Cultivar Group Names are used to designate assemblages of similar cultivars within a species or hybrid, e.g. *Lolium perenne* Early Group. Such groups are often associated with a cultivar name, and in this case the Group Name is normally written in parentheses, e.g. *Lolium perenne* (Early Group) cv. Devon Eaver. In the ITF, Cultivar Group Names are put in the Infraspecific Epithet field so that the associated Cultivar Name, if required, can be put in the Cultivar field. In the ITF, the Cultivar Group Name is *not* put in parentheses; the parentheses can always be added on printouts and reports by individual formatting programs.

Field 12: Infraspecific Epithet

Short Name	INFREPI
Start Position	87
Length	40

The epithet of the *lowest* infraspecific rank of the name of the plant.

Rules of Syntax

1. The Infraspecific Epithet must be one word (except in the case of Rules of Information 1.1, 2, 4 and 5, below).

2. It must only consist of lower-case letters (a-z), and may contain one or two hyphens. No other characters are allowed (except in the case of Rules of Information 1.1, 4 and 5, below).

3. If the infraspecific taxon is over 40 characters long, it should be truncated, not abbreviated. (No examples known other than Hybrid Formulae).

4. The field may be left blank to indicate that the plant is not identified below the species level. It must be left blank if the species epithet is not known.

Rules of Information

1. If the Infraspecific Rank Flag (INFRANK) is S, V or F, the name must be a epithet in the rank denoted by that field, validly published under the Botanical Code, except in the following special case:

   1.1 Where a new infraspecific taxon has not been formally described, "subsp. nov." or "var. nov." or "forma nov." may be entered, if possible followed by a unique identifier, such as the collector's name and number or the locality.

2. If the Infraspecific Rank Flag (INFRANK) is H, I or J, the Infraspecific Epithet must be a Hybrid Formula, with the lower case letter "x" between the species epithets of the two parents. The infraspecific ranks of the two parents must be as denoted by the value of the Infraspecific Rank Flag, as outlined under the rules for that field. If the formula is too long, truncate from the right of the second name.

3. If the Infraspecific Rank Flag (INFRANK) is K, L or M, the Infraspecific Epithet must be a Latin Collective name for an infraspecific hybrid, the rank of the parents being denoted by the value of the Infraspecific Rank Flag, as outlined under the rules for that field. The name must be valid under the Cultivated Code.

4. If the Infraspecific Rank Flag (INFRANK) is G, the Infraspecific Epithet must be a Non-Latin Collective Name. It must be valid under the Cultivated Code.

5. If the Infraspecific Rank Flag (INFRANK) is U, the Infraspecific Epithet must be a Cultivar Group Name as outlined in Note 2 under the rules for the Infraspecific Rank Flag. Parentheses should not be included. It must be valid under the Cultivated Code.

Notes

1. Under the rules of botanical nomenclature, every trinomial below the level of species is unique. Hence *Rhododendron arboreum* subsp. *delavayi* var. *peramoemum* can be known uniquely as *Rhododendron arboreum* var. *peramoemum*. Therefore the name can consist of the genus, the species and the *lowest* infraspecific taxon, qualified by its rank.

2. Annex 1 explains the meaning of the various hybrid terms used above, in particular the difference between Hybrid Formulae names and Latin Collective Names.

3. A field length of 40 characters is chosen because of the need to cover Hybrid Formulae.

Field 13: Cultivar

Short Name	CULTIVAR
Start Position	127
Length	30

The cultivar name of the plant.

Rules of Syntax

1. The entry should consist solely of the cultivar name. The abbreviation "cv." should not be used in the field, nor should the entry be enclosed by single or double quotation marks. (These can be added very simply in output programs.)

2. If the cultivar name is over 30 characters long, it should be truncated, not abbreviated.

Rules of Information

1. The cultivar must be a valid name under the Cultivated Code.

2. Where the cultivar name follows the generic name directly, e.g. *Betula* cv. Jermyns, the previous five fields (Fields 8-12) should be left blank.

Notes

1. A cultivar is a segment of the variation of cultivated plants being clearly distinguished by any characters that are retained when the cultivar is reproduced sexually or asexually.

2. Cultivar names are written in outputs *either* between single quotation marks *or* preceded by the abbreviation "cv.", e.g. *Citrullus lanatus* 'Sugar Baby' or *Citrullus lanatus* cv. Sugar Baby.

3. The first character of the cultivar name is upper case, as are the first characters of other words in the name, except where linguistic usage determines otherwise.

4. The Cultivated Code rules that on or after 1 January 1959, cultivar names must be in a modern language, and may be of up to 3 words, and may include hyphens, numbers, etc. Cultivars named before this date, or cultivars subsequently formed by changes in rank from specific or infraspecific taxa named under the Botanical Code, may keep their Latin form, as in the example *Malus sikkimensis* cv. Rockii, which is based upon *Malus rockii*.

Field 14: Rank Qualified

Short Name	RANKQUAL
Start Position	157
Length	1

The epithet of the taxon qualified by the entry in Identification Qualifier (next field).

Rules of Syntax

1. If the value in the Identification Qualifier is not a space, the entry must be one of the values in the Table below, where the second column denotes the level of the name that is qualified:

Syntax	*Information*
G	Genus
S	Species
I	Infraspecific taxon
C	Cultivar

   In each of these cases, the entry in the field that is qualified (e.g. Species, Cultivar) must not be spaces. If the field qualified is Genus, the entry in Genus must not be a family name or the word "UNKNOWN".

2. If the value of the Identification Qualifier is a space, this field must be a space also.

Field 15: Identification Qualifier

Short Name	IDQUAL
Start Position	158
Length	1

A standard term to qualify the identification of the taxon; see introductory note (under C. Plant Name) and previous field.

Rules of Syntax

1 The entry must consist of one of the characters in the table below:

Syntax	*Conventional Notation*	*Information*
A	aff.	akin to or bordering to
C	cf.	compare with
F	forsan	perhaps
N	near, nr	close to
Q	?	questionable
space	Field is not applicable	

The above meanings are taken from Stearn (1973).

TABLE 1

	1. A complex hybrid	2. A complex non Latin coll. name	
6. GENHYB	.	X	6.
7. GENUS	Magnolia.....	Odontioda.....	7.
8. SPECHYB	H	.	8.
9. SPECIES	campbellii x sprengeri.....	.....	9.
11. INFRANK	.	.	11.
12. INFREPI	mollicomata x elongata.....	.....	12.
13. CULTIVAR	.....	The Pearl x Ruby Glow.....	13.

	3. A 'group' hybrid	4. A Latin collective name	
6. GENHYB	.	.	6.
7. GENUS	Lilium.....	Rhododendron.....	7.
8. SPECHYB	.	x	8.
9. SPECIES	.....	praecox.....	9.
11. INFRANK	U	.	11.
12. INFREPI	Bellingham Hybrids.....	.....	12.
13. CULTIVAR	Shuksan.....	.....	13.

	5. An example including a grex	6. Garden plants are sometimes known only as a hybrid of one species, i.e. the male parent is not known	
6. GENHYB	.	.	6.
7. GENUS	Rhododendron.....	Rhododendron.....	7.
8. SPECHYB	.	H	8.
9. SPECIES	.....	wardii.....	9.
11. INFRANK	G	.	11.
12. INFREPI	Fabia.....	.....	12.
13. CULTIVAR	Minterne Apricot.....	.....	13.

D. VERIFICATION DATA

This set of fields indicates the degree of confidence that can be placed on the identification of the plant's name. Clearly, in the course of its life in a particular botanic garden, an individual species may be identified several times, by different people. In general terms, this field refers to the *most recent* identification, subject, however, to the proviso that a level of "3" would not normally be changed to a "2" or a "1" (unless a lack of confidence in an earlier monographer is to be indicated.) Individual gardens will rely on their own knowledge in such situations.

Field 16: Verification Level

Short Name	VERILEV
Start Position	159
Length	1

The level to which the plant has been verified.

Rules

1. The entry must be one of the values in the table below:

Syntax	*Meaning*
0	The name of the plant has not been checked by any authority;
1	The name of the plant has been determined by comparison with other, named, living plants;
2	The name of the plant has been determined by a taxonomist or other competent person using the facilities of a library and herbarium, or other documented living material;
3	The name of the plant has been determined by a taxonomist who is currently or has been recently involved in a revision of the family or genus.
space	The name of the plant may or may not have been checked by an authority.

Notes

1. The use of a space in the field is not encouraged but may be necessary for gardens that do not have compatible systems or where such information is not stored.

2. The value for the first entry in the table above is zero not capital "O".

Field 17: Verifier's Name

Short Name	VERIBY
Start Position	160
Length	20

The name of the person or persons who verified the identification of the plant, as qualified in the previous field.

Rules

1. If the previous field, Verification Level, is space or zero, this field must be blank.

Recommendations

1. The name should be in the form of Surname, comma, initials of given names. Titles should be omitted.

2. If several names are needed, normally the initials should be omitted.

Field 18: Verification Date

Short Name	VERIDATE
Start Position	180
Length	8

The date on which the name used in this record was verified.

Rules of Syntax

1. The date is an 8-digit number to record, in this order:

   Year (4 digits);
   Month (2 digits);
   Day (2 digits).

   In this notation, leading zeroes have to be included, i.e. January is coded as "01" not "1".

   Example: 19851109 9 November 1985
   19510203 3 February 1951

2. If the day of the month is not known, the last two digits should be set to spaces.

3. If the day and the month are not known, the last four digits should be set to spaces.

4. If the year is not known or if the plant has not been verified, all eight digits should be set to spaces.

Note

The ITF records the year as a full 4-digit number to facilitate the use of the system in the next century, as well as to track verifications from the previous century.

E. SEXUALITY

This field records the sexuality of accessions.

It applies only to sexually reproducing plants, and so does not apply to agamospermous taxa (taxa that produce seed without sexual fusion). Within sexually reproducing plants, it applies solely to dioecious taxa, that is plants with unisexual rather than bisexual (hermaphrodite) flowers and where each individual bears either male or female flowers but not both (although in addition it may bear hermaphrodite flowers in the case of polygamous plants).

Field 19: Sex

Short Name	SEX
Start Position	188
Length	1

The sex of the accession

Rules

1. A space signifies that the taxon does not reproduce sexually or if it does it is not known to be dioecious.

2. Any other entry must consist of one of the characters in the table below, each of which states that the plant is dioecious:

Syntax	*Meaning*
M	"Male", defined as plants which do not produce functional female flowers
F	"Female", defined as plants which do not produce functional male flowers
B	The accession includes plants which produce both male and female flowers; this includes polygamous plants.
Q	Sex unknown

Notes

1. Most plants are hermaphrodite or bisexual, i.e. their flowers have both male and female parts; *this field does not apply to them.* Nor does it apply to monoecious taxa, that is taxa with separate male and female flowers, both types being borne by the same individual.

2. This field is particularly important in records on cycads for example, especially when used for conservation and breeding purposes.

F. SOURCE DATA

This set of fields records the source of the accession, i.e. how the botanic garden obtained the living plant. This is vitally important for conservation, where plants of known wild source origin are far more valuable than plants whose origins are not known.

The first two fields provide a key to the types of sources for the accessions. It is important that these be completed as far as possible. This coding system was developed for IUCN and botanic gardens by Michael Lear, a horticultural consultant, and has been subject to extensive peer review and elaboration since. It is by no means an easy task to make the system watertight, but BGCS is confident that this is as good a system as possible.

The remaining, more extensive fields provide the actual data on the source of the plant, such as the collector's name and number. Although this is useful data to hold, it is obviously secondary in importance to the first two fields.

Field 20: Provenance Type

Short Name	PROVTYPE
Start Position	189
Length	1

A code to indicate the provenance of the plant accessioned.

Rules of Syntax

1. The entry must be one of the values in the Table below:

Syntax	*Information*
W	Plant of wild source
Z	Propagule from a wild source plant in cultivation
G	Plant not of wild source
space	Insufficient data to determine which of the above categories applies

Rules of Information

The terms outlined above are defined as follows:

W Plants which originate from material collected in the wild. The plant has not been propagated further other than growing on from the original stock. These plants may have come directly from the wild or via a botanic garden or seed bank acting solely as a distribution centre. Plants in this category normally have information regarding place, date, altitude, ecological notes and the collector's name and number. However, this category may cover plants that are definitely of wild source but which do not have such additional data.

Z Plants directly propagated from the original wild source plant. Here it is most important that the method of propagation should be recorded in the following field, Propagation History. If the propagation is not directly from the original wild source plant, a full history of the intermediate propagation must be known.

G Cultivated plants not in the above two categories and normally including cultivars, garden hybrids and species that are not definitely from a wild source.

Field 21: Propagation History

Short Name	PROPHIST
Start Position	190
Length	2

A code to indicate the nature of the production of the plant material accessioned, for use in association with the previous field, Provenance Type.

Rules of Syntax

1. The entry must be one of the values in the Table below:

Syntax	*Meaning*
S	Seed or plant arising from seed
SA	From the wild
SB	From controlled pollination
SC	From plants in cultivation that are taxonomically or physically isolated and are definitely self-pollinated
P	Seed or plant arising in cultivation from
PA	Seed set by open pollination (excluding apomixis)
PB	Seed set under insufficiently controlled conditions (excluding apomixis)
PC	Where there is uncertainty that the criteria of S and V are fulfilled.
V	Plant material derived asexually
VA	By vegetative reproduction (excluding apomictic cloning)
VB	By apomictic cloning.
Spaces	No information

2. The first character of Propagation History cannot be P if the Provenance Type is W.

Notes

1. The second character is optional to permit more detailed data to be recorded.

2. The values "P", "PA", "PB" and "PC" refer only to seed that has been produced by sexual fusion and so omits seed produced by apomixis.

3. Seed set in cultivation arising from apomixis is placed under "VB", not any of the "P" categories.

The table below summarises the fields Provenance Type and Propagation History. It assesses the genetic integrity of the accession by combining the relevant codes. The shading indicates the various grades assigned and is designed to help decide when a collector's number can be transferred following propagation. Also, the table gives a general guide to the assessment of each accession's conservation value.

PROVTYPE	PROPHIST: S or P sexual repro.		PROPHIST: V asexual repro.	PROPHIST: SPACE▲ No info.
W (plant of wild source)	WS (1)		WV (1)	W▲ (1)
Z (Propagation from wild source plant in cult.)	ZS (2)	ZP (3)	ZV (1)	Z▲ (3)
G (Plants not of wild source)	GS (3)	GP (3)	GV (3)	G▲ (3)
SPACE (insufficient data)▲	ΔS (3)	ΔP (3)	ΔV (3)	Δ▲ (3)

Grade 1 (unshaded)	WS, WV, ZV, W(space)	Plant material that is a genetic sample of a wild population
Grade 2 (pale shading)	ZS	Plants whose genetic quality may have been affected by the artificial conditions of cultivation
Grade 3 (dark shading)	Remainder	Plants of unknown genetic constitution or of cultivated origin.

Grade 1 plants are of the greatest importance to the conservation of wild species. Sexually produced material is to be preferred when available to clonal material (e.g. cuttings) as this is capable of expressing a greater genetic range.

Grade 2 plants. It is very difficult to recreate natural breeding conditions in cultivation and therefore plants derived from this source can deviate genetically from wild plants. For example genetic modification can come about by inbreeding depression or by selection of plants that are fittest under cultural not wild conditions. However, in certain circumstances, Grade 2 plants *can* have great relevence to conservation. The controlled breeding of plants that do not reproduce successfully in the wild would be one example.

Grade 3 plants may include plants of great relevance to the conservation of cultivated plants, e.g. old crop varieties.

Field 22: Donor Type

Short Name	DONORTYP
Start Position	192
Length	1

A code to indicate the type of donor from which the accession was acquired.

Rules

1. The entry must consist of one of the characters in the table below:

Syntax	*Meaning*
E	Expedition
B	Botanic Garden or Arboretum
R	Research/Field/Experimental Station
U	University Department
H	Horticultural Association/Garden Club
M	Municipal department
N	Nursery or other commercial establishment
S	Staff of the botanic garden to which the record system applies
I	Individual
Space	No information or not applicable

2. If there is doubt as to which entry is correct, or if more than one entry applies (e.g. for a plant collected by the botanic garden staff on an expedition), the highest entry in the Table should be used.

Notes

This field is included as an optional extra, to provide information about the Donor (next field). In most cases, however, the value of the Donor field is understandable if this field is not filled in.

Field 23: Donor

Short Name	DONOR
Start Position	193
Length	20

The person or institution or business from which the accession was acquired.

Rules of Syntax

None.

Rules of Information

Plant material may come to a garden from many sources and in various ways. The information under these headings cannot be coded or fully standardised. The following guidelines should be used wherever possible:

1. Directly from the wild, received usually from the collector. The name of the collector (surname, comma, initials) should be given first, followed by the name of the country or area to which the expedition was made; or, if the expedition has its own title, e.g. S.B.E.C. (Sino-British Expedition to China), this should be followed by the name of the country or area. Abbreviations or truncations should be used as necessary.

2. From other Botanic Gardens. Instead of the name, use the standard IAPT code (see Field 3), e.g. K, CGG, AAH, MO.

3. From private individuals. The minimum information should be the name (surname, comma, initials) and country. More detail, e.g. town and province, could be added if space permits.

4. From horticultural or specialist plant societies. The name of the society (abbreviated or truncated as necessary), followed by the name of the country in which the society is based.

5. From urban parks or garden centres or commercial plant suppliers. The name of the institution (abbreviated or truncated as necessary), followed by the country in which it is situated.

Field 24: Donor's Accession Identifier

Short Name	DONACCID
Start Position	213
Length	12

Used when a plant is transferred from one *garden* to another, this is the unique identifier from the *previous* garden record system.

Rules of Syntax

1. The Donor's Accession Identifier may consist of any characters in the ASCII character set (Annex 2).

2. The entry should be justified (ranged) left, even if it is solely a number, with the first digit being placed at the first position in the field. If, for example, the value is 234, the "2" should be at Position 213, the starting position, rather than 3 characters to the left of Position 224, the last position.

Rules of Information

1. If the plant was originally collected by or for the garden from the wild or came from a source that did not have a record system, the field should be left blank.

2. Otherwise:

    1. The Donor's Accession Identifier should be a unique set of characters that identifies each plant in the donor's own record system.

    2. In the case of multiple plants of the same taxon from one collection site or multiple plants derived from a single seed sowing, a single value of the Donor's Accession Identifier is permissable.

Notes

This field is *not* the Collector's number for the plant; that data is held under Collector's Identifier, Field 32.

G. PLACE OF ORIGIN

Data on the *location* from where the plant was collected in the wild is held according to the geographical transfer system that IUCN has provided in draft form for the Taxonomic Databases Working Group (Mackinder, 1986).

The data are held in a hierarchy of 2 levels from the 4-5 level full hierarchy provided in the full transfer scheme. The system is so designed that the combination of the first and lowest level in the system is unique (exactly analagous to the genus/species and the lowest infraspecific taxon in a plant name.)

The two levels are:

1. Political country, strictly following the ISO system;

2. Lowest level of subdivision from the IUCN system.

Note that the geographical information relates to the place where the plant was collected *not* to the full distributional range of the plant. The latter is not incorporated in the ITF because it should be supplied to garden record databases from taxonomic databases and is not needed in transfer information.

Field 25: Country of origin

Short Name	ISOCODE
Start Position	225
Length	2

The letter code for the country of origin, as assigned by the International Standards Organization (ISO).

Rules of Syntax

1. The code must consist of 2 upper case letters (A-Z).

Rules of Information

1. The entry in the field must be a valid entry as defined by the International Standards Organization (ISO Standard 3166).

2. Two additional entries are permitted in addition to those defined by ISO:

Syntax	*Meaning*
XX	Country unknown
XY	Country not applicable

Note

The ISO area codes are assigned by the International Organization for Standardization (ISO) and are available from national standards organisations in member states. BGCS can provide copies if need be.

Field 26: Geographical Area

Short Name	GEOGAREA
Start Position	227
Length	30

An entry from the lowest tier in the geographical classification system.

Rules of Syntax

None.

Rules of Information

1. The entry must be a valid entry in second tier of the IUCN geographical classification. Since, however, this system is still in the course of development, free text entries may be used. Users should ensure they cover defined geographical units, such as an island or a county or province, rather than an undefined locality such as a mountain or site.

2. Protected areas (e.g. national parks and nature reserves) should be treated as Localities (next field), not as Geographical Areas.

Field 27: Locality

Short Name	LOCALITY
Start Position	257
Length	40

The locality where the plant was collected within the country and country units assigned in the previous two fields.

Notes

This field is an area of free text.

Where the "locality" covers more than one country, e.g. "Himalayas", and the country is unknown, an entry in the locality field may be used in conjunction with the value "XX" (country unknown) in the field Country of Origin.

Field 28: Altitude

Short Name	ALTITUDE
Start Position	297
Length	9

The altitude in metres at which the plant was collected or the altitudinal range within which it was collected.

Rules of Syntax

1. All entries are justified (ranged) left.
2. Entries may be of two forms:
    1. *Single value*: The altitude at which the plant was collected.

       If the altitude is approximate, defined here as accurate to less than 100 metres, the capital letter "C" should be placed in front of the number.

    2. *Range*: The altitudinal range from within which the plant was collected. This is coded as the lower number, followed by a hyphen, followed by the higher number.
3. Heights below sea-level are denoted by a hyphen sign in front of the number. all numbers must be within the range of -400 (Dead Sea) to 8393 (Mt Everest).
4. The numbers should not contain any punctuation.
5. If the altitude is not known, the field should be set at spaces.

Rules of Information

1. The figure represents the altitude at which the plant was collected, rather than the altitudinal range within which it occurs.
2. The altitude must be expressed in metres (the symbol "m" or word "metres" is *not* included in the entry).

Examples

```
1270.....
C1300....
100-150..
4000-4500
-200.....
-200--100
```

Field 29: Latitude

Short Name	LATITUDE
Start Position	306
Length	7

The latitude where the plant was collected.

Rules of Syntax

1. The first two positions in the field consist of the latitude in degrees within the range 0 - 90.

2. If the latitude in degrees is given, the third and fourth positions consist of the minutes for that latitude within the range 0 - 59. If the minutes are not known, the third and fourth positions should be set to spaces, as should the fifth and sixth positions.

3. If the latitude is given in degrees and minutes, the fifth and sixth positions consist of the seconds for that latitude within the range 0 - 59. If the seconds are not known, the fifth and sixth positions should be set to spaces.

4. If the first two positions are filled with numbers, not spaces, the last position must consist of one of the letters "N" or "S" (for North or South).

5. In Rules 1-3, above, numbers below 10 are indicated with a preceding zero, e.g. 03, 07.

6. If the latitude is not known, the field should be set to spaces.

Field 30: Longitude

Short Name	LONGTUDE
Start Position	313
Length	8

The longitude where the plant was collected.

Rules

1. The first three positions in the field consist of the longitude in degrees within the range 0 - 180.

2. If the longitude in degrees is given, the fourth and fifth positions consist of the minutes for that longitude within the range 0 - 59. If the minutes are not known, the fourth and fifth positions should be set to spaces, as should the sixth and seventh positions.

3. If the longitude is given in degrees and minutes, the sixth and seventh positions consist of the seconds for that longitude within the range 0 - 59. If the seconds are not known, the sixth and seventh positions should be set to spaces.

4. If the first two positions are filled with numbers, not spaces, the last character must consist of one of the letters "E" or "W" (for East or West).

5. In Rule 1, above, numbers below 100 are indicated with a preceding zero, e.g. 095, and numbers below 10 with two preceding zeroes, e.g. 005, 007. In Rules 2-3, above, numbers below 10 are placed with a preceding zero, e.g. 03, 07.

6. If the latitude is not known, the field should be set to spaces.

Field 31: Collector's Name

Short Name	COLNAME
Start Position	321
Length	30

The name of the person who collected the plant from the wild.

Rules of Syntax

None.

Recommendations

The name should be in the form of Surname, comma, initials of given names. Titles should be omitted.

If several names are needed, normally the initials should be omitted.

Field 32: Collector's Identifier

Short Name	COLID
Start Position	351
Length	10

The number of the collection as assigned to it by the collector (previous field).

Rules of Syntax

1. If the Collector's Name is blank, this field should be blank also.

2. Otherwise the Collector's Identifier may consist of any characters in the ASCII character set (Annex 2).

3. The entry should be justified (ranged) left, even if it is solely a number, with the first digit being placed at the first position in the field. If, for example, the value is 234, the "2" should be at Position 351, the starting position, rather than 3 characters to the left of Position 360, the last position.

Rules of Information

1. Collector's Number should be the number assigned by the collector to the plant in the field. He or she should not reuse the number for other collections.

Notes

Very often a collector's name and number is the key to locality data of great value to the conservation of wild plants.

The use of the collector's name and number on a plant label or in a plant catalogue implies no loss of genetic integrity from the original collection. This can be checked by reference to other fields: collector's names and numbers should only normally be cited for plants that are "Grade 1" as shown by the combination of Provenance Type and Propagation History. For Grade 2 plants, it is quite legitimate to put a Collector's name and number in the ITF record, e.g. Kingdon Ward 21003, but it does *not* mean that this plant is in fact what is commonly known as Kingdon Ward 21003, rather that it has been derived from that plant in some way.

H. CONSERVATION DATA

Field 33: IUCN Conservation Category

Short Name	IUCNCAT
Start Position	361
Length	2

The IUCN Conservation (Red Data Book) category to denote the degree ot threat to the taxon in the wild on a world scale, as assigned by the IUCN Threatened Plants Unit.

Rules of Syntax

1. The entry must be *either*:

   One of the values below:

Value	*Meaning*
(space)	No information or not applicable.
X	Extinct
E	Endangered
V	Vulnerable
R	Rare
I	Indeterminate
K	Insufficiently known
Q	Unknown
C	Candidate
S	Safe, i.e. neither rare nor threatened.

   Or one of the following combinations:

   XE
   EV
   ER
   VR
   VS
   RS

Rules of Information

1. The category refers to the degree of threat to the native and naturalised populations of the taxon on a world scale. It does *not* refer to the threat to the population from which the plant was collected.

2. The categories are used in accordance with the definitions given in Annex 3. A booklet explaining their use, with examples, is available free of charge from the Threatened Plants Unit (specify English, French or Spanish version.)

This field is included so that IUCN can fill in the categories for species on ITF datafiles sent to them from gardens, for inclusion in the gardens' own databases. It should *not* be used for gardens' own assessments of the status of plants; these should be sent separately to the IUCN Threatened Plants Unit, 53 The Green, Kew, Richmond, Surrey TW9 3AA, U.K.

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Annex 1

A Note on Hybrids

Hybrids are by the far most difficult type of plants to cover in any computer record system. They cause great problems for any computerized system as in many cases they imply a doubling of the name-fields. The scheme outlined in the ITF provides the ability to cover most but not all situations that could be encountered in a garden record database. The text below provides the botanical background to the coverage of hybrids in the formal definitions above.

1. *Sexual Hybrids*

Hybrids produced by sexual crossing can be named in one of three ways (A, B and C below); A and B are governed by the Botanical Code, C by the Cultivated Code.

1.A *Hybrid Formulae*

In this method, the name consists simply of the names of the parent taxa connected by the multiplication sign (interpreted on typewriters and word-processors as the lower case letter "x").

Where the individual sexes of the parents are known, it is usual to list the female parent first. Alternatively, the sexes can be indicated by the characters (M) and (F) after the names, or by the conventional signs used in science for male (♂) and female (♀). For many garden plants, however, the direction of the cross is not known and so these refinements are not covered by the ITF. Similarly the abbreviations "M" and "F" should not be added to names in the ITF.

Examples:

Acer davidii × *rufinerve*
Polypodium vulgare subsp. *prionodes* × subsp. *vulgare*
Rhododendron cinnabarinum subsp. *cinnabarinum* × subsp. *xanthocodon*
Magnolia campbellii subsp. *mollicomata* × *M. sprengeri* var. *elongata*

As the above examples show, formulated hybrids can be very complex and it is doubtful if any computer programme to print out entries from a database using similar formats to the ITF could cope with all the possible situations. Some compromises are necessary.

One way to hold such records in a computer is to allow multiple values within a field, using software that permits variable length records. If that is not possible, an alternative is to use *two* records in the datafile, connected together by linking codes; this option was rejected as too complex for the ITF.

1.B *Latin Collective Names*

Here the hybrid has been given a scientific (Latin) name of its own, which is preceded by a multiplication sign (without a space inbetween). On a typewriter, however, normally a capital or lower case exe ("X" or "x") is used, separated on both sides by a space.

Latin Collective names are the commonest method of referring to hybrids.

A Latin Collective Name covers all progeny of any particular hybrid combination, rather than the progeny of a single specific cross between those parents.

Examples:

× *Cupressocyparis*	(refers to all crosses between species of *Cupressus* and *Chamaecyparis*)
Lonicera × *tellmanniana*	(refers to all crosses between *L. sempervirens* and *L. tragophylla*)

1.C *Non-Latin Collective Names*

As the above heading suggests, these are modern language equivalents of Latin Collective Names that similarly cover all progeny of any particular hybrid combination. A non-Latin Collective Name includes both directions of the cross; for example the taxon that is the pollen parent on one occasion can become the seed parent on another and the results of both crosses bear the same name.

The name must not consist of more than three words. Often they include the terms Hybrid, Cross, Crosses, Grex (abbreviated to "g." or "G."). The usage of the term grex has become institutionalized and widely used, particularly with rhododendrons and orchids.

Examples:

Lilium Bellingham Hybrids	Interspecific hybrids between *L. humboldtii* and *L. pardalinum*
Rhododendron Fabia Grex	All progeny of *R. dichroanthum* x *R. griersonianum*

These examples are straight crosses between two species; however, there are collective names that have more compex parentage, involving hybrids or interspecific taxa, e.g. *Rhododendron* Jalisco Grex, which is a compound of four species: R. "Dido" (*R. decorum* × *R. dichroanthum*) × R. "Lady Bessborough" (*R. campylocarpum* var. *elatum* × *R. discolor*).

If the collective epithet is followed by a cultivar name, the collective name is usually placed in parentheses, e.g. *Lilium* (Bellingham Hybrids) cv. Shuksan. However, the Cultivated Code rules that the parentheses may be omitted, and, where the context is clear, the word grex or its abbreviation may also be omitted, e.g. *Rhododendron* Fabia cv. Minterne Apricot. It should be noted that the collective (grex) name can also be used in a clonal sense, e.g. *Rhododendron* Fabia cv. Fabia, where this is the clone descended from the original cross between the two species. It is not surprising that non-Latin Collective Names can cause problems for record systems.

2. *Non-Sexual hybrids*

Graft Hybrids and Graft Chimaera

Hybrids can also be produced by grafting two different taxa together to produce a graft hybrid, also called a graft-chimaera. Such plants are named in exactly the same way as sexual hybrids except that the plus sign is used instead of the multiplication sign.

Example:

+ *Laburnocytisus adamii*	The graft-chimaera between *Cytisus purpureus* and *Laburnum anagyroides*;
Syringa + *correlata*	The graft-chimaera between *Syringa* x *chinensis* and *S. vulgaris*

Annex 2

Definition of ASCII

ASCII is the American Standard Code for Information Interchange. The ITF uses the official ASCII. It does not use the extended versions of ASCII used on various computer systems, because the extensions vary from one computer to another.

[The list below will provide the official ASCII definition, awaited from the ASCII organisation.]

Decimal (base 10)	*Hex (base 16)*	*ASCII meaning*
32	20	space
33	21	!
34	21	"
35	23	#
[and so on]		
122	7A	z

Values outside this range are *not* standard ASCII and so *are not allowed* in the ITF.

Annex 3

Definitions of the IUCN Conservation (Red Data Book) Categories

A. THREATENED CATEGORIES

Extinct (Ex)

Taxa which are no longer known to exist in the wild after repeated searches of their type localities and other known or likely places.

Endangered (E)

Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating.

Included are taxa whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Vulnerable (V)

Taxa believed likely to move into the Endangered category in the near future if the causal factors continue operating.

Included are taxa of which most or all the populations are *decreasing* because of over-exploitation, extensive destruction of habitat or other environmental disturbance; taxa with populations that have been seriously *depleted* and whose ultimate security is not yet assured; and taxa with populations that are still abundant but are *under threat* from serious adverse factors throughout their range.

Rare (R)

Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk.

These taxa are usually localized within restricted geographical areas or habitats or are thinly scattered over a more extensive range.

Indeterminate (I)

Taxa *known* to be Extinct, Endangered, Vulnerable or Rare but where there is not enough information to say which of the four categories is appropriate.

B. UNKNOWN CATEGORIES

Status Unknown (?)

No information.

Candidate (C)

Taxa whose status is being assessed and which are suspected but not yet definitely known to belong to any of the above categories.

Insufficiently known (K)

Taxa that are suspected but not definitely known to belong to any of the above categories, following assessment, because of the lack of information.

C. NOT THREATENED CATEGORY

Safe (nt).

Neither rare nor threatened.

NOTES

1. Some combinations are permitted, falling into two series. Within the threatened categories, the following combinations are permitted, signifying that the plant is definitely in one or the other of the two categories concerned:

Extinct/Endangered	Ex/E
Endangered/Vulnerable	E/V
Endangered/Rare	E/R
Vulnerable/Rare	V/R

   Between the threatened categories and the safe (not threatened) category, the following signify that the plant is on the *borderline* between the two categories concerned or that the plant is in one category in part of its range, in the other elsewhere:

Vulnerable/not threatened	V/nt
Rare/not threatened	R/nt

   It does *not* signify that the plant could be anywhere on the scale encompassed by those categories; if that was the case, the category Unknown should be used.

2. The symbols following the terms defined on the previous page are those used for display by TPU in printouts and lists of endangered species. They have been reduced to one or two character capital letters for the use of the ITF. A conversion table is listed below.

ITF version	*Display version*
X	Ex
E	E
V	V
R	R
I	I
K	K
Q	?
C	C
S	nt
XE	Ex/E
EV	E/V
ER	E/R
VR	V/R
VS	V/nt
RS	R/nt

0503z
HS

TABLE 2

Example of Type 1 Record

Field	Contents
RECTYPE:	1
NAME OF INSTITUTION:	Peterville University B.G.....
DATE ITF FILE WRITTEN:	19870901
DATE TO WHICH FILE REFERS:	19870901
CONTACT NAME:	Berry, M.Y.....
ITF VERSION:	01.00
FILE CONTENTS:	

A list of the wild origin accessions of Saxifraga L. in cultivation at Peterville University Botanic Garden as of 1 September 1987.....
.....
.....

TABLE 3

Example of Type 2 record: a well-documented record.

Field	Contents
RECTYPE:	2
RECSTAT:	.
GARDCODE:	TCD..
ACCID:	87-0034.....
ACCSTAT:	C
GENHYB:	.
GENUS:	Claoxylon.....
SPECHYB:	.
SPECIES:	linostachys.....
AGGFLAG:	.
INFRANK:	S
INFREPI:	brachyphyllum.....
CULTIVAR:	.....
RANKQUAL:	.
IDQUAL:	.
VERILEV:	2
VERIBY:	Strahm, W.....
VERIDATE:	198507..
SEX:	M
PROVTYPE:	W
PROVHIST:	VA
DONORTYP:	E
DONOR:	Wyse Jackson, P.S...
DONACCID:	.....
ISOCODE:	MU
GEOGAREA:	Mauritius.....
LOCALITY:	Petrin Nature Reserve, S. of Curepipe...
ALTITUDE:	500-700..
LATITUDE:	2023..S
LONGITUDE:	05728..E
COLNAME:	Wyse Jackson, P.S.....
COLID:	M076.....
IUCNCAT:	K.

TABLE 4

Example of Type 2 record: a well-documented species.

Field	Contents
RECTYPE	2
RECSTAT:	.
GARDCODE:	E....
ACCID:	840269.....
ACCSTAT:	C
GENHYB:	.
GENUS:	Utricularia.....
SPECHYB:	.
SPECIES:	globulariifolia.....
AGGFLAG:	.
INFRANK:	.
INFREPI:	.....
CULTIVAR:	.....
RANKQUAL:	.
IDQUAL:	.
VERILEV:	2
VERIBY:	Argent, G.....
VERIDATE:	19840531
SEX:	.
PROVTYPE:	W
PROPHIST:	VA
DONORTYP:	.
DONOR:	Argent & Ratter.....
DONACCID:	.....
ISOCODE:	BR
GEOGAREA:	Sao Paulo.....
LOCALITY:	Jureia.....
ALTITUDE:	0-700....
LATITUDE:	2430..S
LONGITUDE:	04715..W
COLNAME:	Argent & Ratter.....
COLID:	628.....
IUCNCAT:	..

TABLE 5

Example of Type 2 record: a formulated hybrid cultivar.

Field	Contents
RECTYPE:	2
RECSTAT:	A
GARDCODE:	TCD..
ACCID:	85-0176.....
ACCSTAT:	C
GENHYB:	.
GENUS:	Tritonia.....
SPECHYB:	X
SPECIES:	crocosmiflora.....
AGGFLAG:	.
INFRANK:	.
INFREPI:	.....
CULTIVAR:	Carmin Brillant.....
RANKQUAL:	.
IDQUAL:	.
VERILEV:	1
VERIBY:	Kelly, J.....
VERIDATE:	1985....
SEX:	B
PROVTYPE:	G
PROPHIST:	VA
DONORTYP:	.
DONOR:	.....
DONACCID:	.....
ISOCODE:	XX
GEOGAREA:	.....
LOCALITY:	.....
ALTITUDE:	.....
LATITUDE:	.....
LONGITUDE:	.....
COLNAME:	.....
COLID:	.....
IUCNCAT:	..

TABLE 6

Example of a Type 2 record: a complex hybrid.

Field	Contents
RECTYPE:	2
RECSTAT:	.
GARDCODE:	E....
ACCID:	721968.....
ACCSTAT:	C
GENHYB:	.
GENUS:	Rhodohypoxis.....
SPECHYB:	H
SPECIES:	baurii x milloides.....
AGGFLAG:	.
INFRANK:	.
INFREPI:	.....
CULTIVAR:	.....
RANKQUAL:	.
IDQUAL:	.
VERILEV:	3
VERIBY:	Burtt, B.L.....
VERIDATE:	19731215
SEX:	.
PROVTYPE:	G
PROVHIST:	VA
DONORTYP:	.
DONOR:	Burtt, B.L.....
DONACCID:	.....
ISOCODE:	LS
GEOGAREA:	Mpendlhe.....
LOCALITY:	Mawaqua Mt., Bulwer.....
ALTITUDE:	.....
LATITUDE:	.....
LONGITUDE:	.....
COLNAME:	Burtt, B.L.....
COLID:	7214.....
IUCNCAT:	..

TABLE 7

Example of Type 2 record: A species determined as "Aff".

Field	Contents
RECTYPE:	2
RECSTAT:	.
GARDCODE:	E....
ACCID:	761478.....
ACCSTAT:	.
GENHYB:	.
GENUS:	Aciphylla.....
SPECHYB:	.
SPECIES:	hectori.....
AGGFLAG:	.
INFRANK:	.
INFREPI:	.....
CULTIVAR:	.....
RANKQUAL:	S
IDQUAL:	A
VERILEV:	0
VERIBY:	.....
VERIDATE:	.....
SEX:	.
PROVTYPE:	G
PROVHIST:	S.
DONORTYP:	.
DONOR:	Inchriach Nursery...
DONACCID:	.....
ISOCODE:	..
GEOGAREA:	.....
LOCALITY:	.....
ALTITUDE:	.....
LATITUDE:	.....
LONGITUDE:	.....
COLNAME:	.....
COLID:	.....
IUCNCAT:	..